

## **LARRY WAYNE HOROWITZ**

Geophysical Fluid Dynamics Laboratory/NOAA • Princeton University

P.O. Box 308 • Princeton, NJ 08542

(609) 452-6520 • Fax (609) 987-5063 • lwh@gfdl.noaa.gov • <http://www.asp.ucar.edu/~larryh/>

### **PROFESSIONAL EXPERIENCE**

2001-present **GEOPHYSICAL FLUID DYNAMICS LABORATORY**, Princeton, New Jersey  
Physical Scientist

My current research focuses on tropospheric trace gases and aerosols. I use global chemical transport models to simulate the chemical and dynamical processes affecting these species.

1999-2001 **GEOPHYSICAL FLUID DYNAMICS LABORATORY**, Princeton, New Jersey  
Visiting Scientist, Atmospheric and Oceanic Sciences Program, Princeton University

My work aimed to improve our understanding of the processes controlling tropospheric trace gas distributions. I used global chemical transport models to study the impact of chemistry and transport on ozone and related chemical species.

1997-1999 **NATIONAL CENTER FOR ATMOSPHERIC RESEARCH**, Boulder, Colorado  
Postdoctoral Fellow, Advanced Study Program / Atmospheric Chemistry Division

My research focused on simulating the chemistry of ozone and related species in the troposphere. Using a three-dimensional global model, I studied the dependence of ozone concentrations on emissions of ozone precursors from anthropogenic and natural sources.

### **EDUCATION**

1993-1997 **HARVARD UNIVERSITY**, Cambridge, Massachusetts  
Ph.D. in Atmospheric Chemistry/Applied Mathematics, Division of Engineering and Applied Sciences, degree received November 1997  
Committee: Professors Daniel Jacob (advisor), Michael McElroy, Steven Wofsy

My research focused on the tropospheric photochemistry of ozone, nitrogen oxides, and non-methane hydrocarbons. I developed a photochemical mechanism describing the reactions occurring within the continental boundary layer and the global troposphere, for use in chemical models. Using a three-dimensional chemical transport model, I examined the impact of non-methane hydrocarbon chemistry on the global distributions of ozone and nitrogen oxides. Thesis title: The influence of boundary layer chemistry on global tropospheric ozone and nitrogen oxides.

1991-1993 **HARVARD UNIVERSITY**, Cambridge, Massachusetts  
S.M. in Applied Physics, Division of Applied Sciences

Emphasis on the chemistry and physics of the atmosphere. Additional courses in applied mathematics, including numerical techniques.

Summer 1990 **WEIZMANN INSTITUTE OF SCIENCE**, Rehovot, Israel

Research on spectroscopy in molecular jets, Department of Chemical Physics, Karyn Kupciet International Science School, funded to attend.

## LARRY WAYNE HOROWITZ

1987-1991     **HARVARD COLLEGE**, Cambridge, Massachusetts  
A.B. summa cum laude in Chemistry  
Advisors: Professors Elias Corey, William Klemperer  
  
Extensive coursework in physical and organic chemistry, mathematics, and physics.

### ACADEMIC HONORS

1993-1996     **NASA Graduate Student Fellowship in Global Change Research**  
Provided funding for tuition, stipend, and travel  
1991-1993     **Ernst Habicht Fellowship**, Harvard University  
Provided funding for tuition and stipend  
1991            Elected to **Phi Beta Kappa**  
1987-1991     **John Harvard Scholarship**, Harvard College, for academic achievement

### TEACHING EXPERIENCE

1992-1997     **Harvard University Teaching Fellow**, Department of Earth and Planetary Sciences  
Taught weekly sections, prepared and graded homeworks and exams  
  
Environmental Sciences, Professors Brian Farrell and Michael McElroy  
Chemical Oceanography, Professor Heinrich Holland, graduate-level class  
Atmospheric Chemistry, Professor Daniel Jacob  
Environmental Pollution, Professors Raymond Siever and Daniel Jacob  
  
Fall 1993       **Harvard University Teaching Fellow**, Undergraduate Core Curriculum Program  
Taught weekly sections, prepared and graded homeworks and exams  
  
The Atmosphere, Professors Michael McElroy and Daniel Jacob  
  
1990-1991     **Harvard University Course Assistant**, Department of Mathematics  
Taught weekly sections and graded homeworks  
  
Linear Algebra and Differential Equations, Professor Shlomo Sternberg  
Multivariable Calculus, Professor David Kazhdan

### PROFESSIONAL SERVICE AND AFFILIATIONS

1999-present   **Atmospheric Environment**, Reviewer  
1999-present   **Journal of Atmospheric Chemistry**, Reviewer  
1999-present   **National Science Foundation, Division of Atmospheric Sciences**, Reviewer  
1998-present   **Journal of Geophysical Research - Atmospheres**, Reviewer  
1998-present   **NASA Office of Earth Science, Atmospheric Chemistry Modeling and Analysis Program**, Reviewer  
1996-present   **American Geophysical Union**, Member

## LARRY WAYNE HOROWITZ

### PUBLICATIONS

- Horowitz, L.W., S. Walters, D.L. Mauzerall, L.K. Emmons, P.J. Rasch, C. Granier, X.X. Tie, J.-F. Lamarque, M.G. Schultz, G.S. Tyndall, J.J. Orlando, and G.P. Brasseur, A global simulation of tropospheric ozone and related tracers: Description and evaluation of MOZART, version 2, submitted to *J. Geophys. Res.*, August 2002.
- Emmons, L., P. Hess, A. Klonecki, X. Tie, L. Horowitz, J.-F. Lamarque, D. Kinnison, G. Brasseur, E. Atlas, E. Browell, C. Cantrell, F. Eisele, R.L. Mauldin, J. Merrill, B. Ridley, R. Shetter, The budget of tropospheric ozone during TOPSE from two CTMs, submitted to *J. Geophys. Res.*, *TOPSE special section*, 2002.
- Gauss, M., G. Myhre, G. Pitari, M. J. Prather, I. S. A. Isaksen, T. K. Berntsen, G. P. Brasseur, F. J. Dentener, R. G. Derwent, D. A. Hauglustaine, L. W. Horowitz, D. J. Jacob, M. Johnson, K. S. Law, L. J. Mickley, J.-F. Müller, P.-H. Plantévin, J. A. Pyle, H. L. Rogers, D. S. Stevenson, J. K. Sundet, M. van Weele, O. Wild, Radiative forcing in the 21<sup>st</sup> century due to ozone changes in the troposphere and the lower stratosphere, submitted to *J. Geophys. Res.*, 2002.
- Prather, M.J., M. Gauss, T. Berntsen, I. Isaksen, J. Sundet, I. Bey, G. Brasseur, F. Dentener, R. Derwent, D. Stevenson, J. Lee Grenfell, D. Hauglustaine, L.W. Horowitz, D. Jacob, L. Mickley, M. Lawrence, R. von Kuhlmann, J.-F. Muller, G. Pitari, H. Rogers, M. Johnson, M. van Weele, O. Wild, Fresh air in the 21st Century?, submitted to *Geophys. Res. Lett.*, 2002.
- Tie, X., L. Emmons, L. Horowitz, G. Brasseur, B. Ridley, E. Atlas, C. Stround, P. Hess, A. Klonecki, S. Madronich, R. Talbot, and J. Dibb, Effect of sulfate aerosol on tropospheric NO<sub>x</sub> and ozone budgets: Model simulations and TOPSE evidence, submitted to *J. Geophys. Res.*, *TOPSE special section*, 2002.
- Mauzerall, D.L., L. Horowitz, and N. Kim, Factors regulating the seasonal cycle of inter-continental air pollution transport between Asia, the United States, and Europe, to be submitted to *J. Geophys. Res.*, 2002.
- Tie, X., G. Brasseur, L. Emmons, L. Horowitz, and D. Kinnison, Effects of Aerosols on Tropospheric Oxidants: A Global Model Study, *J. Geophys. Res.*, *106*, 22,931-22,964, 2001.
- Mauzerall, D.L., D. Narita, H. Akimoto, L. Horowitz, S. Walters, D. Hauglustaine, G. Brasseur, Seasonal characteristics of tropospheric ozone production and mixing ratios over East Asia: A global three-dimensional chemical transport model analysis, *J. Geophys. Res.*, *105*, 17,895-17,910, 2000.
- Spivakovsky, C.M., J.A. Logan, S.A. Montzka, Y.J. Balkanski, M. Foreman-Fowler, D.B.A. Jones, L.W. Horowitz, A.C. Fusco, C.A.M. Brenninkmeijer, M.J. Prather, S.C. Wofsy, and M.B. McElroy, Three-dimensional climatological distribution of tropospheric OH: Update and evaluation, *J. Geophys. Res.*, *105*, 8931-8980, 2000.
- Horowitz, L.W., and D.J. Jacob, Global impact of fossil fuel combustion on atmospheric NO<sub>x</sub>, *J. Geophys. Res.*, *104*, 23,823-23,840, 1999.
- Horowitz, L.W., J. Liang, G.M. Gardner, and D.J. Jacob, Export of reactive nitrogen from North America during summertime: Sensitivity to hydrocarbon chemistry, *J. Geophys. Res.*, *103*, 13,451-13,476, 1998.

## LARRY WAYNE HOROWITZ

- Liang, J., L.W. Horowitz, D.J. Jacob, Y. Wang, A.M. Fiore, J.A. Logan, G.M. Gardner, and J.W. Munger, Seasonal budgets of reactive nitrogen species and ozone over the United States, and export fluxes to the global atmosphere, *J. Geophys. Res.*, *103*, 13,435-13,450, 1998.
- Olson, J., M. Prather, T. Berntsen, G. Carmichael, R. Chatfield, P. Connell, R. Derwent, L.Horowitz, S. Jin, M. Kanakidou, P. Kasibhatla, R. Kotamarthi, M. Kuhn, K. Law, J. Penner, L. Perliski, S. Sillman, F. Stordal, A. Thompson, and O. Wild, Results from the Intergovernmental Panel on Climatic Change photochemical model intercomparison (PhotoComp), *J. Geophys. Res.*, *102*, 5979-5991, 1997.
- Staffelbach, T., A. Neftel, and L.W. Horowitz, Photochemical oxidant formation over southern Switzerland, 2, Model results, *J. Geophys. Res.*, *102*, 23,363-23,373, 1997.
- Hirsch, A.I., J.W. Munger, D.J. Jacob, L.W. Horowitz, and A.H. Goldstein, Seasonal variation of the ozone production efficiency per unit  $\text{NO}_x$  at Harvard Forest, Massachusetts, *J. Geophys. Res.*, *101*, 12,659-12,666, 1996.
- Jacob, D.J., L.W. Horowitz, J.W. Munger, B.G. Heikes, R.R. Dickerson, R.S. Artz, and W.C. Keene, Seasonal transition from  $\text{NO}_x$ - to hydrocarbon-limited conditions for ozone production over the eastern United States in September, *J. Geophys. Res.*, *100*, 9315-9324, 1995.
- Munger, J.W., D.J. Jacob, B.C. Daube, L.W. Horowitz, W.C. Keene, and B.G. Heikes, Formaldehyde, glyoxal, and methylglyoxal in air and cloudwater at a rural mountain site in central Virginia, *J. Geophys. Res.*, *100*, 9325-9333, 1995.

## PRESENTATIONS

- Budget of tropospheric ozone in MOZART-2, Max Planck Institute for Meteorology, Hamburg, Germany, June 2002.
- Overview of MOZART-2, ITCT 2K2 Planning Meeting, Boulder, CO, November 2001.
- Status of MOZART-2, MOZART Workshop, Boulder, CO, November 2001.
- Global simulation of tropospheric ozone and related tracers: Description and evaluation of MOZART, version 2, AGU Spring Meeting, Boston, MA, May 2001.
- A global simulation of tropospheric ozone and related tracers: Description and evaluation of MOZART, version 2, MOZART Workshop, NCAR, Boulder, CO, April 2001.
- MOZART-2: Recent updates and comparison with observations, MOZART Workshop, UIUC, Urbana-Champaign, IL, September 2000.
- MOZART-2: Model evaluation and recent updates, MOZART Workshop, Nederland, CO, May 2000.
- MOZART-2: Model description and evaluation, MOZART Workshop, Max Planck Institute for Meteorology, Hamburg, Germany, January 2000.
- Update on model development at NCAR and status of IPCC effort, NCAR/LLNL Model Symposium, NCAR, Boulder, CO, October 1999.
- Global simulation of tropospheric ozone using MOZART-2, NCAR/ASP Research Report, Boulder, CO, October 1999.
- Current status of MOZART-2, MOZART Workshop, NCAR, Boulder, CO, September 1999.
- Tropical tropospheric ozone: The role of biomass burning and lightning, NCAR/ACD Research Report, Boulder, CO, July 1999
- Model Simulation of Tropical Tropospheric Ozone, and Its Dependence on Biomass Burning, Lightning, and Convection, AGU Spring Meeting, Boston, MA, June 1999.
- Tropospheric ozone in the tropics: The role of biomass burning and lightning, NCAR/ASP Presentation, Boulder, CO, May 1999.
- 2-D and 3-D chemical transport modelling: Preliminary results and future plans for the MOZART-2 model, NCAR/ASP Research Report, Boulder, CO, October 1998.

Tropospheric ozone in the tropics: The role of convection, NCAR/ASP Research Report, Boulder, CO, May 1998.

Update on recent work on the MOZART model, NCAR/ACD Presentation, Boulder, CO, March 1998.

The Impact of Fossil Fuel Combustion on the Global Distributions of Tropospheric Nitrogen Oxides and Ozone, AGU Fall Meeting, San Francisco, CA, December 1997.

The Impact of Fossil Fuel Combustion on the Global Distributions of Tropospheric Nitrogen Oxides and Ozone, AGU Fall Meeting, San Francisco, CA, December 1996.